

AP Statistics Practice Test (page 734)

T11.1 b. There are 10 categories and the degrees of freedom is equal to the number of categories $- 1$.

T11.2 c. This is a test for homogeneity because the data came from 4 independent random samples.

T11.3 e. All three conditions hold.

T11.4 d. 8% of the population is Hispanic and there was a sample size of 148, so the expected count is $148(0.08)$.

T11.5 c. With $df = 3$, the P -value is 0.087.

T11.6 c. The largest contribution is 3.20 and is from the Hispanic cell.

T11.7 b. There are 3 rows and 2 columns so the $df = (3 - 1)(2 - 1) = 2$.

T11.8 a. Multiply the row total by the column total and divide by the table total.

T11.9 d. This was not an experiment so no conclusion of causation can be made. Additionally, the P -value was quite high so we do not have convincing evidence of an association.

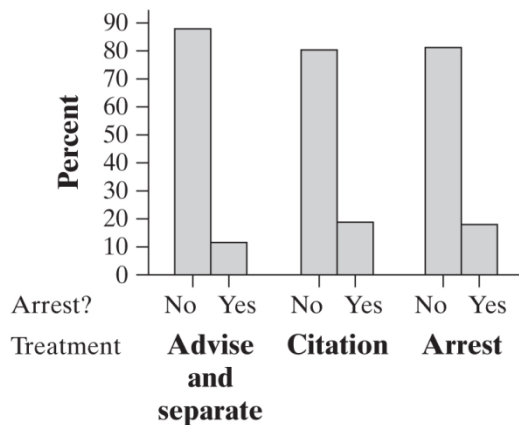
T11.10 d. A Type I error is when we reject the null hypothesis when it is really true. In other words, we find convincing evidence that the alternative hypothesis is true, when in reality it is not true.

T11.11 *State:* We want to perform a test at the $\alpha = 0.05$ significance level of H_0 : The distribution of gas types is the same as the distributor's claim versus H_a : The distribution of gas types is not the same as the distributor's claim. Or, $H_0 : p_{\text{regular}} = 0.6, p_{\text{premium}} = 0.2, p_{\text{supreme}} = 0.2$ versus H_a : At least two of the p_i 's is incorrect. *Plan:* We should use a chi-square test for goodness of fit if the conditions are met. *Random:* The data came from a random sample. *10%:* $n = 400$ is less than 10% of all customers at this distributor's service stations. *Large Counts:* The expected counts in each category are at least 5 (regular: $400(0.6) = 240$, premium: $400(0.2) = 80$, and supreme: $400(0.2) = 80$). *Do:* The test statistic is

$$\chi^2 = \frac{(261 - 240)^2}{240} + \frac{(51 - 80)^2}{80} + \frac{(88 - 80)^2}{80} = 13.15.$$
 With $df = 3 - 1 = 2$, the P -value is between 0.001 and 0.0025. Using technology: P -value = 0.0014. *Conclude:* Because the P -value of 0.0014 is less than $\alpha = 0.05$, we reject H_0 . There is convincing evidence that the distribution of gas type is not the same as the distributor claims.

T11.12 (a) Random assignment was used to create three roughly equivalent groups at the beginning of the study. In other words, the effects of other variables that might affect whether or not there is a subsequent arrest should be evened out among the three treatments.

(b)



(c) H_0 : The true proportion of spouse abusers like the ones in the study who will be arrested within 6 months is the same for all three police responses versus H_a : The true proportion of spouse abusers like the ones in the study who will be arrested within 6 months is not the same for all three police responses.

(d) P -value: If the true proportion of spouse abusers like the ones in the study who will be arrested within 6 months is the same for all three police responses, there is a 0.0796 probability of getting differences between the three groups as large as or larger than the ones observed by chance alone. *Conclusion*: Because the P -value of 0.0796 is larger than $\alpha = 0.05$, we fail to reject H_0 . There is not convincing evidence that true proportion of spouse abusers like the ones in the study who will be arrested within 6 months is not the same for all three police responses.

T11.13 *State*: We want to perform a test of H_0 : There is no association between smoking status and educational level among French men aged 20 to 60 years versus H_a : There is an association between smoking status and educational level among French men aged 20 to 60 years at the $\alpha = 0.05$ level. *Plan*: We should use a chi-square test for independence if the conditions are met. *Random*: The data came from a random sample. 10%: $n = 459$ is less than 10% of all French men aged 20 to 60 years. *Large Counts*: The expected counts are all at least 5 (see table below).

	Primary school	Secondary school	University
Nonsmoker	59.48	44.21	42.31
Former	50.93	37.85	36.22
Moderate	42.37	31.49	30.14
Heavy	34.22	25.44	24.34

Do: The test statistic is $\chi^2 = \frac{(56 - 59.48)^2}{59.48} + \dots + \frac{(16 - 24.34)^2}{24.34} = 13.305$. With $df = (4 - 1)(3 -$

$1) = 6$, the P -value is between 0.025 and 0.05. Using technology: P -value = 0.0384. *Conclude*: Because the P -value of 0.0384 is less than $\alpha = 0.05$, we reject H_0 . There is convincing evidence of an association between smoking status and educational level among French men aged 20 to 60 year